

AABC Commissioning Group

AIA Provider Number 50111116



What is Integrated System Testing for Fire Protection and Life Safety Systems, and how will it affect building commissioning?

Course Number: CXENERGY1711

Shawn Mahoney, PE
National Fire Protection Association

April 17, 2019



IT'S A BIG WORLD. LET'S PROTECT IT TOGETHER.®

Credit(s) earned on completion of this course will be reported to **AIA CES** for AIA members.

Certificates of Completion for both AIA members and non-AIA members are available upon request.

CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

This course is registered with **AIA**



Course Description

What is Integrated System Testing for Fire Protection and Life Safety Systems? Why is it so critical now? How will the requirements for integrated system testing affect you? We will discuss how NFPA 4; The Standard for Integrated Fire Protection and Life Safety System Testing was developed to address a gap in the codes and standards process dealing with confirmation of system integration. We will identify the types of buildings that require integrated system testing and what model codes will require testing to be completed. Finally, you will learn who is involved in integrated system testing and how you can either benefit, or be burned by the new requirements.



Learning Objectives

At the end of the this course, participants will be able to:

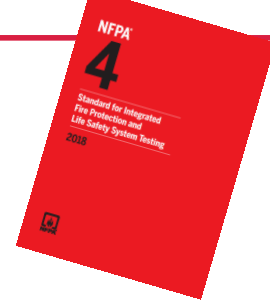
- 1 Understand how the integrated system testing process fits into building commissioning and energy management.
- 2 Identify the major codes that include NFPA 4 as a referenced document
- 3 Identify the various members of an integrated system testing team and their roles and responsibilities
- 4 Summarize the test scenarios, testing frequencies, and documentation required by NFPA 4



Closing the Gap



Documentation in Buildings Today



- Engineering Affidavits
- Contractor Affidavits
- Architect Affidavits
- Inspectional Services Department signoffs
- Fire Department signoffs
- Fire Alarm – third party test company
- Generator – installer w/manufacturer
- Elevator – installer w/State inspector
- Electrical – installer w/ test company
- Sprinkler – installer test reports
- HVAC – installer, TAB and CA
- Security – installer (e.g., MAC systems)
- BMS – building management system installer

NFPA 80
ASME A17.1

INTEGRATED SYSTEMS

Individual systems are each covered by other specifications, governing laws, codes, or standards.

Elevators, fire doors, dampers, etc.

Other monitored system

NFPA 14 Standpipe
NFPA 96 Kitchen Suppression

NFPA 4

NFPA 4

Typical one-way physical system connection

NFPA 13

Automatic sprinkler

Fire alarm or signaling system

Smoke or HVAC control

NFPA 92
NFPA 90A

Typical one-way wireless system connection

Typical two-way physical system connection

NFPA 72

Supervising station alarm system

Emergency comm. system

Fire and smoke doors, dampers, etc.

NFPA 80

Typical individual system

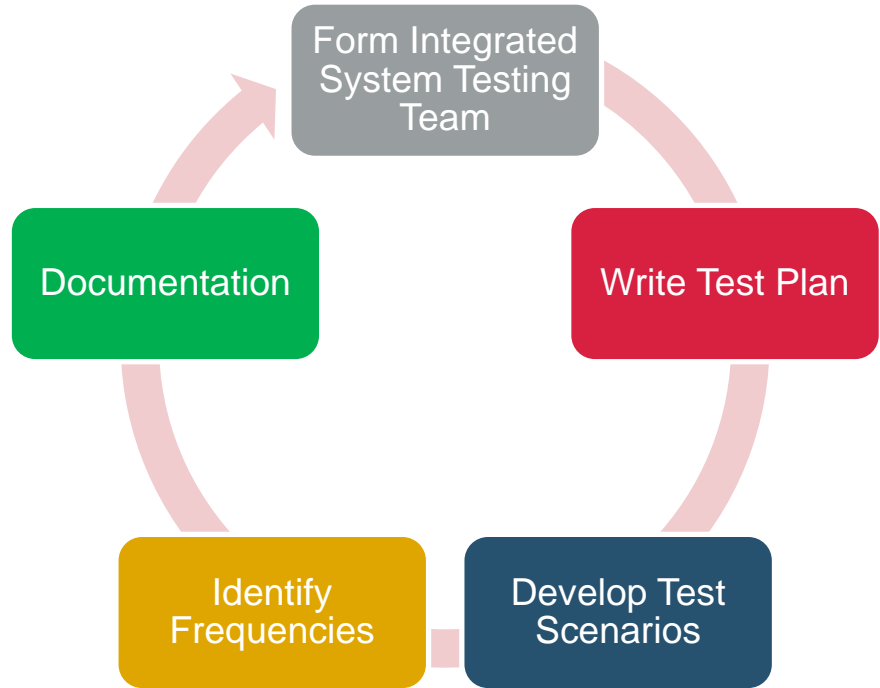
An integrated system may rely on the performance of individual systems with no direct connection to other individual systems

NFPA 1221



NFPA 4: Overview

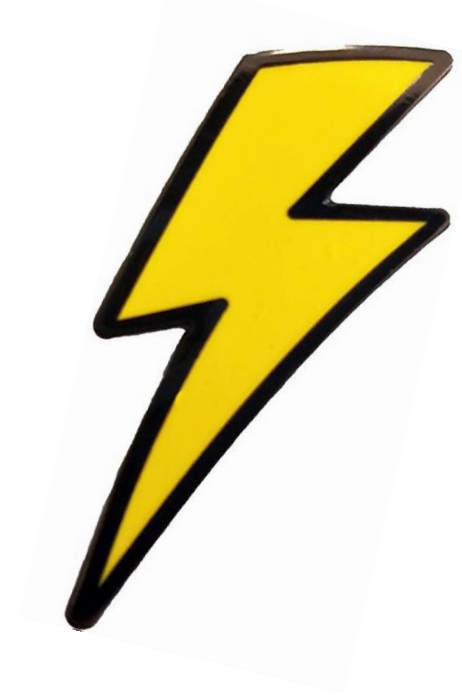
- Terminology
- Goals/Purpose



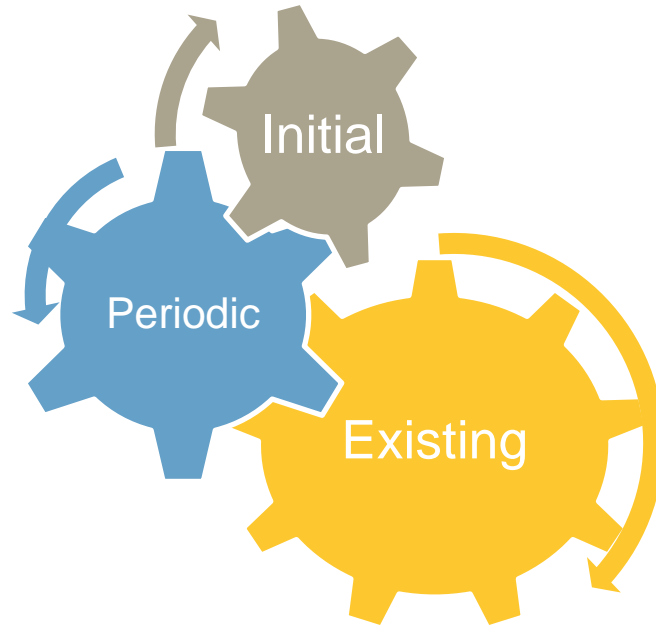
NFPA 4: Integrated Testing Team



NFPA 4: Test Scenarios



NFPA 4: Test Frequencies



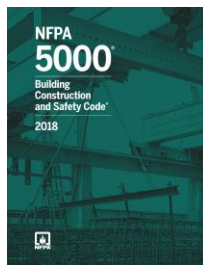
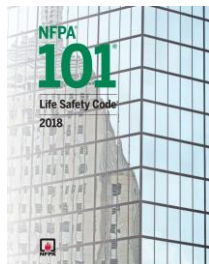
NFPA 4: Documentation

Notes:

- Five-story office building, use Group B. Cafeteria (use Group A) on first floor equipped with an ansul system. Computer room on third floor equipped with a preaction system.
- Upon activation of elevator recall the elevator should stop at primary recall floor. If fire is on primary recall floor the elevator should stop at an alternate recall floor. Primary and alternate recall floor should be coordinated with the fire department.
- Shutdown of mechanical equipment should be interfaced with building automation system.

		System Outputs																	
		Fire Alarm Control Center									Notification		Other Required Fire Safety						
		Activate common alarm signal indicator	Activate audible alarm signal	Activate common supervisory signal indicator	Activate audible supervisory signal	Activate common trouble signal indicator	Activate audible trouble signal	Display and print/change of status and time of initiating event	Transmit alarm to fire department and to central station — mailbox	Illuminate associated detector LED indicator	Activate associated exterior fire alarm beacon(s)	Activate all evacuation signals for the building	Release all magnetically held doors	Recall associated elevator in accordance with recall sequence (see Note 2)	Shut down associated mechanical equipment (see Note 3)		Release preaction valve (charge sprinklers)	Elevator hoistway vent open	
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P				
Alarm Inputs	Fire Alarm System Fire Alarm Inputs	1	Typical manual pull station (by device) — levels 1–5	X	X				X	X		X	X	X				1	
		2	Typical elevator recall smoke detector (by device) — by floor (lobby)	X	X				X	X		X	X	X	X			X	2
		3	Elevator machine room smoke detector	X	X				X	X	X	X	X	X				X	3
		4	Typical smoke detector (by device) — computer room (third floor) — preaction system	X	X				X	X		X	X	X					4
		5	Typical wet sprinkler system flow control valve assembly flow switch — by floor	X	X			X	X	X		X	X	X					5
		6	Typical wet sprinkler system flow control valve assembly tamper switch — by floor			X	X		X										6
		7	Typical preaction sprinkler system flow control valve assembly flow switch — by floor	X	X			X	X	X			X	X					7
		8	Typical preaction sprinkler system flow control valve assembly tamper switch — by floor			X	X		X										8
		9	Kitchen cafeteria ansul system — first floor	X	X				X	X				X				X	9
		10	Typical duct-in smoke detector (by device) — by floor						X						X				10
		11	Fire pump running			X	X		X										11
		12	Fire pump power failure			X	X		X										12

NFPA 4: Why Now



9.11.4 Integrated Fire Protection and Life Safety System Tests.

9.11.4.1 Basic Testing.

Where required by Chapters 11 through 43, installations involving two or more integrated fire protection or life safety systems shall be tested to verify the proper operation and function of such systems in accordance with 9.11.4.1.1 and 9.11.4.1.2.

9.11.4.1.1

When a fire protection or life safety system is tested, the response of integrated fire protection and life safety systems shall be verified.

9.11.4.1.2

After repair or replacement of equipment, required retesting of integrated systems shall be limited to verifying the response of fire protection or life safety functions initiated by repaired or replaced equipment.

9.11.4.2 * NFPA 4 Testing.

Where required by 9.3.5 or Chapters 11 through 43, the following integrated fire protection and life safety systems shall be tested in accordance with 9.11.4.1 and 9.11.4.2.1 through 9.11.4.2.2:

- (1) Integrated fire protection and life safety systems in high-rise buildings
- (2) Integrated fire protection and life safety systems that include a smoke control system

9.11.4.2.1

For new buildings, integrated testing in accordance with NFPA 4 shall be conducted prior to the issuance of a certificate of occupancy.

9.11.4.2.2

For existing buildings, integrated testing in accordance with NFPA 4 shall be conducted at intervals not exceeding 10 years unless otherwise specified by an integrated system test plan prepared in accordance with NFPA 4.

NFPA 4: Why Now



901.6.2 Integrated testing.

Where two or more fire protection or life safety systems are interconnected, the intended response of subordinate fire protection and life safety systems shall be verified when required testing of the initiating system is conducted. In addition, integrated testing shall be performed in accordance with Sections 901.6.2.1 and 901.6.2.2.

901.6.2.1 High-rise buildings.

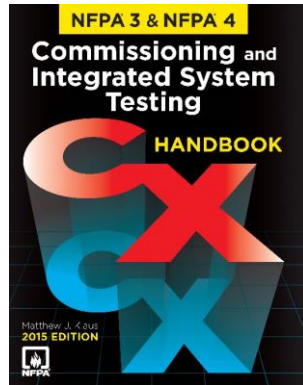
For high-rise buildings, integrated testing shall comply with NFPA 4, with an integrated test performed prior to issuance of the certificate of occupancy and at intervals not exceeding 10 years, unless otherwise specified by an integrated system test plan prepared in accordance with NFPA 4. If an equipment failure is detected during integrated testing, a repeat of the integrated test shall not be required, except as necessary to verify operation of fire protection or life safety functions that are initiated by equipment that was repaired or replaced.

901.6.2.2 Smoke control systems.

Where a fire alarm system is integrated with a smoke control system as outlined in Section 909, integrated testing shall comply with NFPA 4, with an integrated test performed prior to issuance of the certificate of occupancy and at intervals not exceeding 10 years, unless otherwise specified by an integrated system test plan prepared in accordance with NFPA 4. If an equipment failure is detected during integrated testing, a repeat of the integrated test shall not be required, except as necessary to verify operation of fire protection or life safety functions that are initiated by equipment that was repaired or replaced.

NFPA 4: Future

- **A2020 Revision Cycle**
- **Public Comment Date: February 22nd - May 8th 2019**



GET INVOLVED!

NFPA 4: Resources

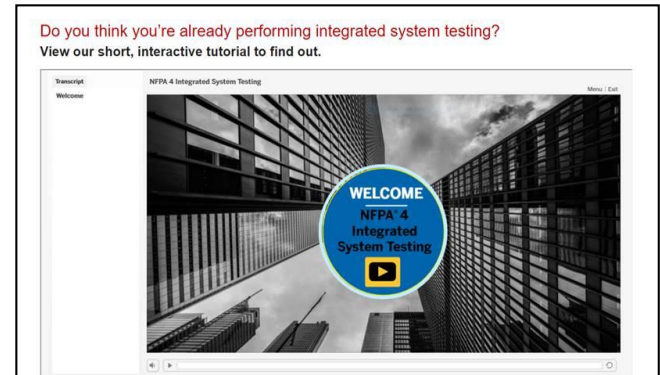
NFPA 4, Integrated Systems Testing Fundamentals Training

Rosemont, IL
April 25, 2019

Tarrytown, NY
May 23, 2019

Visit [nfpa.org/4classroom](https://www.nfpa.org/4classroom) to learn
more and register.

Free online tutorial and
other resources at [nfpa.org/4](https://www.nfpa.org/4)



This concludes The American Institute of Architects
Continuing Education Systems Course

Shawn Mahoney
smahoney@nfpa.org

acg

